

CLAIMS

What is claimed is:

1. A cold plate apparatus comprising:

a circuit board assembly including electronic components mounted thereon, the electronic components protruding from a mounting surface of the circuit board assembly;

a thermally conductive base having a plurality of recesses located in positions corresponding to the electronic components of the circuit board so that with the circuit board assembly in contact with the base, the electronic components are positioned within the respective recesses;

a heat pipe thermal plane engaged with the thermally conductive base and adapted for circulating conductive fluid in the embedded heat pipes for carrying heat dissipated from the electrical components as such heat is produced and transferred into the conductive base; and

at least one compact heat exchanger engaged with the heat pipe thermal plane and adapted for receiving heat conducted thereto by the heat pipe thermal plane.

2. The apparatus of claim 1 wherein the at least one of the circuit board assembly, at least one thermally conductive base, at least one heat pipe thermal plane and the at least one compact heat exchanger, further comprise, and are joined by a brazing material.

3. The apparatus of claim 1 wherein the at least one circuit board assembly, the thermally conductive base, the heat pipe thermal plane and the at least one compact

heat exchanger, further include, and are joined by a thermally conductive adhesive material.

4. The apparatus of claim 1 wherein the at least one of the circuit board assembly, the thermally conductive base, the heat pipe thermal plane and the at least one compact heat exchanger, further include, and are joined by a soldering material.

5. A custom heat pipe thermal plane apparatus comprising:

a thermally conductive base having a plurality of recesses located in positions corresponding to a plurality of electronic components of a circuit board assembly so that the circuit board assembly may be placed in contact with the conductive base with the electronic components positioned within the respective recesses of the base; and

individual heat pipes engaged with the thermally conductive base and adapted for transferring heat into a conductive fluid circulating in the embedded heat pipes for carrying dissipating heat from the electrical components as such heat is produced and transferred into the conductive base.

6. The apparatus of claim 5 wherein at least one of the thermally conductive base and one of the individual heat pipes are joined by a brazing material.

7. The apparatus of claim 5 wherein at least one of the thermally conductive base and one of the individual heat pipes are joined by a thermally conductive adhesive material.

8. The apparatus of claim 5 wherein at least one of the thermally conductive base and one of the individual heat pipes are joined by a soldering material.

9. A method of fabricating a cold plate apparatus, the method comprising the steps of:

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- a) providing a circuit board assembly including electronic components mounted thereon, the electronic components protruding from a mounting surface of the circuit board assembly;
 - b) providing a custom heat pipe thermal plane;
 - c) joining the circuit board assembly with the custom heat pipe thermal plane with a gap filler material so that the electronic components are positioned within the respective recesses thereof;
 - d) joining at least one compact heat exchanger with the custom heat pipe thermal plane and adapting the heat exchanger for receiving heat conducted thereto by the custom heat pipe thermal plane.
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10. The apparatus of claim 9 wherein at least one of the circuit board assembly, at least one of the custom heat pipe thermal plane, and at least one compact heat exchanger further include and are joined by a brazing material.

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11. The apparatus of claim 9 wherein at least one of the circuit board assembly, at least one of the custom heat pipe thermal plane and at least one compact heat exchanger further include and are joined by a thermally conductive adhesive material.

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12. The apparatus of claim 9 wherein at least one of the circuit board assembly, at least one of the heat pipe thermal plane, and at least one compact heat exchanger further include and are joined by a soldering material.